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DOOR OPERATING MECHANISM FOR DUMP CARS

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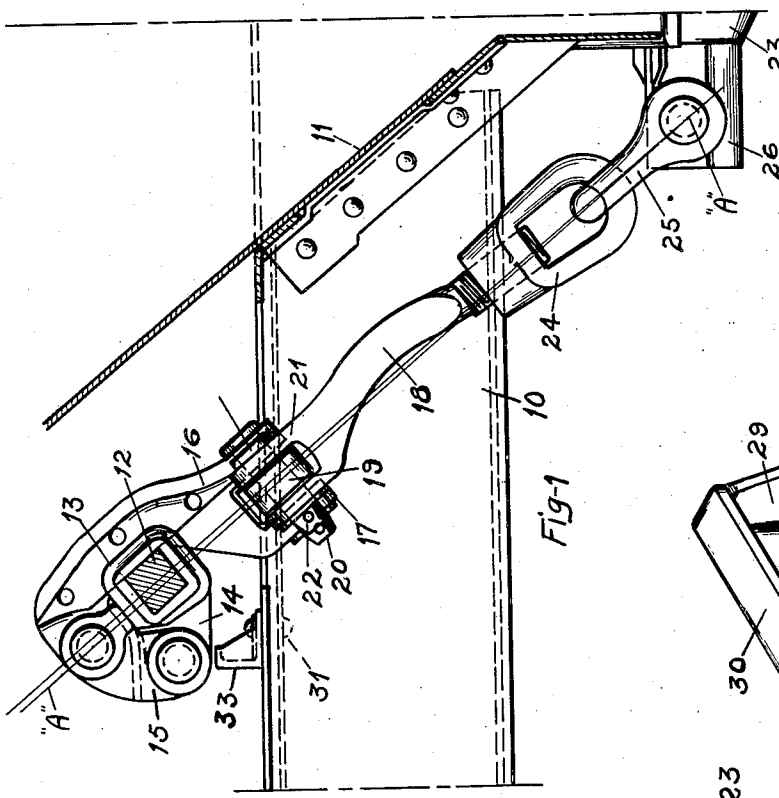



Fig-1

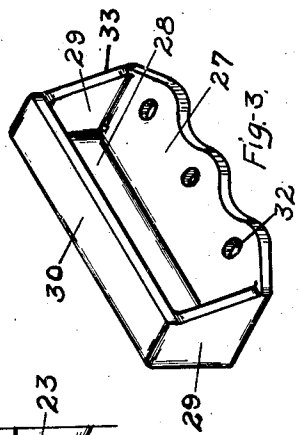



Fig-3.

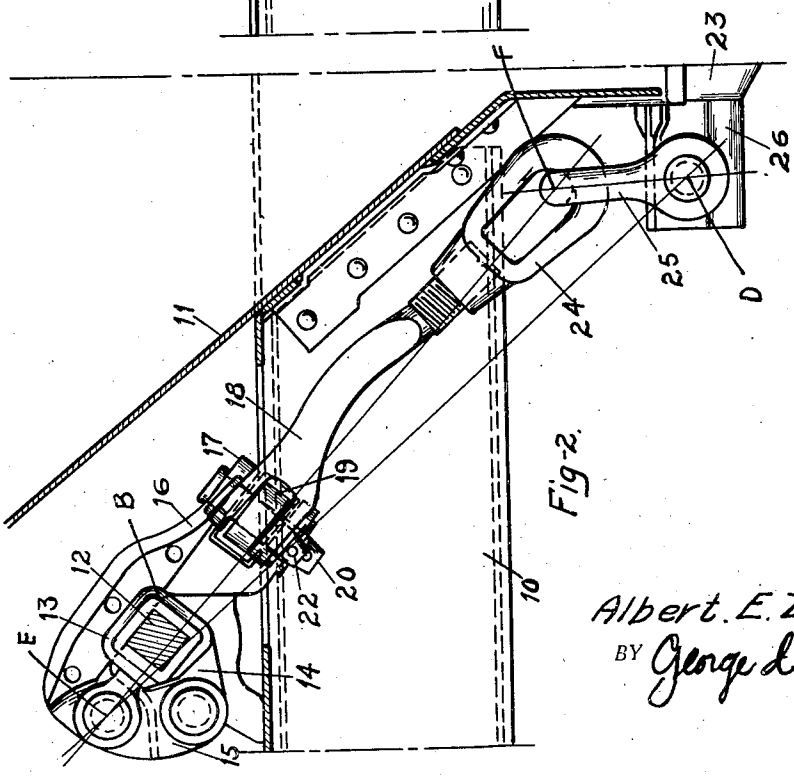



Fig-2.

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## DOOR OPERATING MECHANISM FOR DUMP CARS

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3 Claims. (Cl. 105—299)

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This invention relates to improvements in door operating mechanism for dump cars.

The main object of the invention is to provide, in a mechanism for operating hinged bottom doors of dump cars comprising a rotary lifting shaft and adjustable connections between the shaft and the door operated thereby, simple and reliable safety means for restricting operation of the mechanism under abnormal conditions of adjustment of the parts thereof, thereby protecting the same against damage or breakage.

A more specific object of the invention is to provide in a door operating mechanism of the character set forth including a rotary lifting shaft and an adjustable connection between the lifting shaft and the door, adapted to be wound on the shaft, positive stop means to prevent overwinding of the adjustable connection when the mechanism is out of proper adjustment.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawing, forming a part of this specification, Fig. 1 is a longitudinal, vertical, sectional view taken at one end of a dump car, illustrating my improvements in connection therewith, showing the lifting shaft and sloping end wall of the car at one side of the same in section and the connection between the shaft and the dump door in elevation. Fig. 2 is a view similar to Fig. 1, but illustrative of conditions which may be brought about in a door operating mechanism of this character when no provision is made to prevent overwinding. Fig. 3 is a detail perspective view of the stop member employed in my improvements.

As illustrated in the drawing, my improved operating mechanism is particularly adapted for bottom doors of dump cars and is of the type illustrated in Patent No. 1,547,640, granted July 28, 1925, to Argyle Campbell, which patent discloses a complete operating mechanism of this kind and the arrangement thereof on the car, and reference may be had to the same for an understanding of the general arrangement and structure of a door operating mechanism of the type in which my improvements are embodied.

Referring to Figs. 1 and 2 of the drawing, 10 indicates one of the center sills of a car and 11 the sloping end wall of the car body. The usual rotary shaft 12 of the lifting mechanism is journaled in suitable bearing brackets, not shown, carried by the underframe of the car. The shaft 12 carries a hub 13 provided with a pair of radially extending arms 14, only one of which is shown in the drawing. A link or block 15 is pivotally

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connected to the outer ends of the arms 14 and a locking hanger 16 having a hook-shaped upper end portion is, in turn, pivotally connected to the outer end of the link 15. The hanger 16 has a depending shank portion, which extends below the shaft 12 and is laterally offset at its lower end in the direction of the shaft, forming a head 17 from which are supported the usual set of two links 18, only one of which is shown in the drawing. These links are designed to connect the hanger to the respective doors at opposite sides of the corresponding end of the car. These links are supported from the head of the hanger to swing about axes at right angles to the axis of swinging movement of the hanger. As is the usual practice, the links 18, one of which is shown in Figs. 1 and 2 of the drawing, are disposed at opposite sides of the hanger 16 and are connected to the latter by a transversely extending bar 19 pivotally supported on the hanger by a pin 20. Each link 18 is forked at its upper end, as indicated at 21, to receive the corresponding outer end of the bar 19 and is pivotally connected to the latter by a pin 22. The lower end of this link is anchored to the bottom end of the corresponding dump door which is indicated by 23, the link 18 having an eye member 24 threaded on the lower end of the link. The eye member 24 is connected to a clevis 25 fixed to a projecting bracket 26 at the bottom end of the door 23. As is well known to those skilled in this art, the screw and nut connection between the threaded eye member 24 and the link 18 provides for adjustment in length of the connection between the winding means on the shaft 12 and the door to secure proper closing of the door and take up slack occurring in service.

In this type of dump car, the door 23 is hinged at its upper or outer end and is swung upwardly to closed position when the lifting mechanism is operated through rotation of the shaft 12. In the closed position of the doors as shown in Fig. 1, the mechanism is locked by the hook-shaped end of the hanger 16 being engaged over the hub 13, the weight of the doors and lading of the car being carried on the shaft 12. The arrangement is such that the direction of downward pull is in a straight line, indicated by A—A, passing through the shaft 12 at a point slightly over dead center, thereby assuring a perfect lock at all times and placing the minimum strain on the various parts of the mechanism.

To prevent overthrow of the winding mechanism, that is, winding thereof beyond the position shown in Fig. 1, I provide a stop member 33 mounted on each center sill 10 of the car and ar-

ranged in the path of rotary movement of the arms 14 of the corresponding hub member 13. The stop member 33 is preferably in the form of a box having a horizontal bottom wall 27, a vertical back wall 28, spaced vertical side walls 29—29, and a horizontal top wall 30. The side walls 29—29 taper upwardly, as shown in Figs. 1 and 3, and the top wall 30 is narrower than the bottom wall. The stop member or box 33 is seated on the center sill 10 and is secured to the top flanges of the latter by rivets 31 extending through openings 32 in the bottom wall 27 of the box and aligned openings in the flanges of the center sill. The stop member 33 positively arrests movement of the parts in the position shown in Fig. 1 by engagement of the arms 14 of the winding means therewith, thereby preventing overwinding. In other words, regardless of the adjustment in length of the connecting means between the lifting shaft 12 and the drop door 23, rotation of the shaft 12 will always be limited so that it cannot be turned beyond the position shown in Fig. 1. Thus, if the mechanism is not in proper adjustment to fully close the doors when the shaft 12 is rotated to the position shown in Fig. 1, the rotation of the shaft is positively stopped to prevent overthrow of the winding means which would be serious because of possible damage to the working parts of the mechanism. Overthrow of the lifting and winding mechanism is a constant danger in door operating mechanisms of this character not provided with my improved stop means and frequently results in serious damage to the parts thereof, particularly the hanger and the lifting shaft. Conditions which prevail when there is overthrow of the lifting mechanism are illustrated in Fig. 2, wherein the shaft 12 has been rotated beyond the position shown in Fig. 1, that is, through a greater arc to bring the drop doors 23 in proper relation to the car body to close said doors. A severe strain is thus placed on the parts of the mechanism due to lever action at the point B, which lever action may cause distortion and breakage of the hanger 16 or cause twisting of the lifting shaft 12. The force diagram traced by the lines connecting the points D, E, and F, in Fig. 2, is indicative of the force producing the leverage at the point B.

As hereinbefore pointed out, any possible danger of overthrow of the lifting mechanism is completely eliminated by my improved stop means, the same limiting rotation of the lifting means to a predetermined amount, as illustrated in Fig. 1. Thus, when there is any misadjustment of the mechanism due to lengthening of the connections between the shaft 12 and the door 23, or due to greater movement of the door being required to close the same, rotation of the mechanism is positively stopped even though the door is not completely closed. The attendant is thus forced to



adjust the lifting mechanism to proper overall length for lifting the door to its correct closed position in relation to the car body. This adjustment is made in the usual manner by manipulation of the screw and nut connection between the link 18 and threaded eye member 24.

I claim:

1. In a door operating mechanism for dump cars having a hinged bottom door, a rotary lifting shaft supported on the car, a radial arm on said shaft, and link means inter-connecting the door with and pivotally connected to the radial arm, the improvement which comprises a stop member located in the path of rotary movement of the radial arm in a position adjacent the point where the pivotal connection between the link means and the radial arm is located when the door is in closed position whereby over-winding of the link means and resulting damage to the operating parts are prevented.

2. In a door operating mechanism for dump cars having a hinged bottom door, a rotary lifting shaft supported on the car, a radial arm on said shaft, and link means inter-connecting the door with the radial arm, the improvement which comprises the combination of a link, being a part of said link means and being pivotally connected to said radial arm, and a stop member located in the path of rotary movement of the radial arm in a position adjacent the point where the pivotal connection between the link and the radial arm is located when the door is in closed position whereby over-winding of the link means and resulting damage to the operating parts are prevented.

3. In a door operating mechanism for dump cars having a hinged bottom door, a rotary lifting shaft supported on the car, a radial arm on said shaft, and link means inter-connecting the door with the radial arm, the improvement which comprises the combination of a link, being a part of said link means, being pivotally connected to said radial arm and extending upwardly when the door is in closed position, and a stop member located in the path of rotary movement of the radial arm in a position below the point where the pivotal connection between the link and the radial arm is located when the door is in closed position whereby over-winding of the link means and resulting damage to the operating parts are prevented.

ALBERT E. ZIMMER.


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